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THE
HEAVENLY BODIES:
HOW THEY MOVE
AND
WHAT MOVES THEM.

A NEW THEORY.

BY
DUGALD MACDONALD.

Montreal :
PRINTED AT THE "GAZETTE" PRINTING HOUSE.

1877.



*Presented to Rev. Father Lumbum
With the Compliments of
The Author*

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CAMERON

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INTRODUCTION.

I OFFER no apology for presenting the following pages to the public. If the opinions which I have formed respecting the cause of motion of the heavenly bodies are correct, I conceive it my duty to give them to the world. I am not aware that they are wrong. This is a question for the public to decide. Plato says "that where two things are equally uncertain, wisdom directs us to choose that which is most beneficial to mankind." If my opinions are correct, the world will be the gainer; while, if they are false, the world will have nothing to lose.

In the following pages I will be guided, 1st. By facts recorded in Holy Scripture; 2ndly. By the laws of Natural Philosophy; 3rdly. By the testimony of astronomers; 4thly. By what I see with my own eyes; and 5thly. As in Mathematics, I will accept conclusions which are not intuitively certain, but only when I cannot conceive the contrary to be true.

To do justice to the subject, I am confident that it should be treated at greater length than I propose to do in the following pages. My object is simply to

give my theory to the world. If it should meet with a favorable reception, it is my intention to publish at a future day a much larger volume, in which I will deal at greater length on the various questions connected with the subject. Hitherto, the spots on the sun have occasioned considerable speculation. It will be noticed that in the theory which I now place before the public, those dark spots on the sun play a very important and prominent part.

It was with a spirit of reverential enquiry that I entered into the consideration of the subject. I now rise from it with awe, and wonder at the impiety of a class of men who deny the doctrine of a Divine Providential Government of the world.

DUGALD MACDONALD.

MONTREAL, October, 1877.

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THE HEAVENLY BODIES :

How they Move, and What Moves Them.

CHAPTER I.

CAUSE OF MOTION OF THE HEAVENLY BODIES— OPINIONS OF SCIENTIFIC MEN ON THE SUBJECT.

I DO not pretend to have read all the opinions that scientific men have written on this subject.

It is most remarkable, however, that those astronomers to whose writings I have had access, are by no means unanimous in their opinion as to the natural cause of the motion of the heavenly bodies. Sir Isaac Newton says:—"But yet, I must profess, I know no sufficient natural cause of the earth's diurnal rotation."

"The planets and comets will constantly pursue their revolutions in orbits given in kind and position, according to laws above explained. But though these bodies may indeed persevere by the mere laws of gravity, yet they could by no means have at first derived the regular position of the orbits themselves from these laws." Again he says:—"But it is not to be conceived that mere

mechanical causes could give birth to so many regular motions."

Herschel the elder supposed it might be gravity.

Professor Heinrichs says that Kant the philosopher, like Laplace, assumed the rotation of the primitive body without accounting for the cause of that rotation.

Nichol says that "not one of these remarkable arrangements in the solar system owes its origin to gravity. For instance, gravity cannot account for the fact that all the various orbs, primary and secondary, move in ellipses approaching very nearly to the circular form: nor the fact that all these orbs revolve in the same direction around the sun; nor the fact that they all rotate on their axis in the same direction; nor that equally singular ordinance which has confined so many bodies within a brief distance of the plane of the sun's equator. It appears a necessary conclusion that the cause of the foregoing arrangements is something profounder even than Newton's principle—perhaps some remotest fact in the history of the universe."

Buffon, in a most ingenious manner, argues that the motion of the planets was derived from a collision between a comet and the sun.

Mary Sommerville says that "Laplace has computed the probability to be as 4,000,000 to 1 that all the motions of the planets, both of rotation and revolution, were at once imparted by an original common cause, of which we know neither the nature nor the epoch."

Kirkwood says: "In taking the most cursory view of the solar system, we cannot fail to notice the following interesting facts:

" 1. The sun rotates from west to east.

" 2. The planets move nearly in the plane of the sun's equator.

" 3. The orbital motions of planets and satellites are from west to east.

" 4. The rotary motions are in the same direction.

" 5. The rings of Saturn move in the same direction.

" 6. The planetary orbits are nearly circular.

" The cometary orbits have different peculiarities.

" None of these facts (he says) are accounted for by the law of gravitation. The sun's attraction can have no influence whatever in determining either the direction of the planet's motion or the eccentricity of its orbit."

Arago says: "Everything authorizes us to suppose that the nebulous particles are subject in the vast regions of space to forces of which we have no idea."

Lardner, in speaking of the planets and satellites, says: "They obey the laws of gravitation, but they do much more. They all move in ellipses; those ellipses differ but very little from being circles; their orbits increase in distance from the sun nearly in regular progression; those orbits are nearly in the same plane, and their movements are in the same direction. Accordance so wondrous, and order so admirable, could not be fortuitous, and, not being

enjoined by the conditions of the law of gravitation, must either be ascribed to the immediate dictates of the Omnipotent Architect of the universe above all laws, or to some general laws superinduced upon gravitation, which escaped the sagacity of the discoverer of that principle."

Ennis, in his work on the "Origin of the Stars," ascribes it to gravity.

CHAPTER II.

WHETHER THE MOTIONS OF THE HEAVENLY BODIES ARE DUE TO A NATURAL OR SUPERNATURAL CAUSE.

There is a difference of opinion among scientific men in accounting for the cause of motion of the heavenly bodies. Some consider that it is due to a natural cause, while others ascribe it to the immediate interposition of Divine Providence. How are we to determine this question? I am aware that I would be justified in assuming that the motion of the heavenly bodies is due to a natural cause, without giving any reasons for the assumption; but, before doing so, I deem it prudent to look around with my eyes for the purpose of seeing whether any motions take place in the world, and to enquire whether these motions are due to a supernatural or to a natural cause. I behold the tender leaf

trembling on the tree. I see a ripple on the river. I see huge trees pulled from the roots and dashed upon the ground. I have seen mighty ships tossed on the angry billows of the ocean. I see clouds moving in the heavens. I also see vapor arising from, and rain descending on, the earth. These are a few of the motions which I see around me. The same cause which makes a leaf tremble creates the hurricane. We know that these motions are due to a natural and not to a supernatural cause. We know that the heat of the sun acting on our atmosphere causes the motion of the air. If the air were always at an equal temperature, the wind would not blow, the air would not be in motion ; but so soon as the atmosphere becomes more heated in one place than at another, the equilibrium is disturbed, a movement results—this movement is wind. It carried the commerce of Europe, of Asia and Africa. It filled the sails of the "Pinta," and Christopher Columbus discovered America. It ground the corn of our forefathers, purifies the air of our cities and towns, scatters the clouds, distributes pollen and seeds, and preserves vegetables in a healthy state.

"The mass of water in the tropics," says Lenz, "warmed down to a certain depth by the sun's heat, cannot maintain its equilibrium with the colder water of the middle and higher latitudes ; a flow of the warmer water from the equator to the poles must necessarily take place on this surface, and this surface-flow must be supplied at the equator by a flow of colder water from high latitudes, which would at

first flow in an almost horizontal direction, but which under the equator must rise from below to the surface. In this manner, in the northern hemisphere, a great vertical circulation takes place in the ocean, which has its direction above from the equator to the pole, and below from the pole to the equator. Since these flows, moving in opposite directions, are distinguished by their different temperatures, we observe in the submarine isotherm an indication of the direction of the lower portion of this flow. A corresponding flow, but moving in the opposite direction, takes place in the southern hemisphere; so that in a zone surrounding the equator, where the two flows meet, the water flows almost in the direction from below up to the surface."

We have now seen that there are motions on and over our earth, and that both are due to a natural cause, viz., the influence of the sun upon air and water. From these facts I feel justified in assuming that the motions of the heavenly bodies are due to a natural cause,—and this assumption will be considerably strengthened if I can show that there is something in space on which the heat of the sun would act, and thereby cause that something to move in a manner somewhat similar to that of our air and water.

CHAPTER III.

CREATION OF THE WORLD.

Fortunately there are no rival historians whose narratives are contradictory in regard to the events which occurred anterior to, and at the time of, creation, particularly as to those events which occurred between the first and fourth days of creation.

The facts recorded in reference to those four days are sufficiently perplexing to the mind to cause us to congratulate ourselves on the absence of histories recording the same events; particularly if they contradicted the statements of each other.

Profane history stands as a monument of the mendacious spirit of man. There is scarcely a character or fact in history but is painted in opposite colours.

Holy Scripture informs us of certain facts respecting the creation of the world. I must either accept or deny these facts. If I deny them, I should be prepared to prove that I was present and saw with my eyes what occurred during those days. I was not present, neither have I any record of those events with the exception of that which is recorded in Holy Scripture.

The creation of the world was the act of an Omnipotent Creator, who desired or did not desire that the great work which He accomplished during those four days should be known. If that Omnipotent Creator desired that these events should not be

known, His power could have accomplished this end, no matter how learned or scientific the enquirer might be. The knowledge of these events would have been buried in the Infinite mind of an Infinite God.

On the other hand, if Almighty God desired that the facts should be made known, His power was sufficient to ensure its accomplishment.

Holy Scripture tells us that "In the beginning God created heaven and earth. And the earth was void and empty, and darkness was on the face of the deep; and the Spirit of God moved on the face of the waters. And God said, Be light made.⁺ And light was made. And God saw the light, that it was good: And He divided the light from the darkness."

We are told that "darkness was on the face of the deep."

Darkness, then, was not created on the first day. It was something that existed anterior to the first day. We are not informed that God annihilated this darkness.

We must either accept or reject the fact "that darkness was upon the face of the deep."

What is darkness? Is it something or nothing?

In answer to the first question, I may be informed that darkness is the negative or opposite of light. We are told by the same authority that God made light on the first day. What is light? My reader may answer that light is the opposite of darkness. When God created light, was it something or nothing? Light was the object of a special creation

of Almighty God. I am forced to believe that light is something, and that darkness is something also.

Let us now attempt to suppose the contrary, and behold how ridiculous it will appear:—"And *nothing* was upon the face of the deep, and be *nothing* made."

We have now light and darkness. "And God saw the light, that it was good: And He divided the light from the darkness." How did Almighty God "divide" the light from the darkness? I am unable to answer this question. I will merely say that it was an act performed by Almighty God in a supernatural manner.

On the fourth day God created the sun "to divide" the light from the darkness.

By what means does the sun divide the light from the darkness? I answer, By natural means; because those means are not beyond my comprehension. Now, we see that the sun, in a natural manner, "divides" light from darkness; while Almighty God "divided" light from darkness in a supernatural manner.

How do we "divide" dross from gold? How do we "divide" water from spirits? I answer, By fire. Then the fire of the sun, that most subtle of all the elements, "divides" the light from the darkness, and performs in a natural manner that which Almighty God, for four days, performed in a supernatural manner.

But where is this darkness? And where is this light?

I will not devote much time to answer these questions. Where do we see these? I answer, Everywhere. When one is visible the other is invisible, but both are present everywhere throughout the whole of space. I have endeavoured to show that light and darkness are something, and that something is diffused throughout space. That space is not empty, but full.

CHAPTER IV.

THAT THERE IS A MEDIUM IN SPACE.

In the Bridgewater Treatise, Whewell says: "The question of a *plenum* and *vacuum* was formerly much debated among those who speculated concerning the constitution of the universe; that is, they disputed whether the celestial and terrestrial spaces are absolutely full, each portion being occupied by some matter or other; or whether there are, between the material parts of the world, empty spaces free from all matter, however rare."

Then he goes on to say that "within the last few years facts have been observed which show, in the opinion of some of the best mathematicians of Europe, that such a very rare medium does really occupy the spaces in which the planets move." He further adds that "reasons might be offered founded on the universal diffusion of light, and on other

grounds, for believing that the planetary spaces cannot be entirely free from matter of some kind."

Speaking on this subject, Lockyer says: "Encke's Comet, for instance, now performs its revolutions round the sun in three days less than it did eighty years ago. It has been affirmed that this effect is due to the friction offered by the ethereal medium."

I consider it unnecessary to swell these pages by inserting numerous extracts from authors who have written on the subject. But what is this medium? Sir Isaac Newton calls it an "elastic medium." Lockyer calls it an "etherial medium." Other writers call it the "luminiferous ether." It is also called the "ether of space." Since the year 1822 some writers have called it a "resisting medium" from the fact that Encke's Comet is supposed to be retarded by it. However, the medium of space is matter of some kind, and matter presents itself to us under three conditions, viz: the solid, the liquid, and the gaseous. It would be rash to say that the medium of space was solid. It is reasonable to infer that it is a gas of some kind which probably enters into the composition of our atmosphere. Of every 10,000 parts of air there are—

Oxygen	2,100
Nitrogen.....	7,750
Aqueous vapor.....	142
Carbonic acid gas.....	4
Carburetted hydrogen.....	4
	10,000

It will be noticed that oxygen forms an important part in the composition of the atmosphere. Chem-

istry tells us that oxygen was first called "vital air," that "it is the only element which forms compounds with all others." They further say that "it is the most widely diffused and important of the elements, and by its agency combustion and life are alone sustained."

In speaking of the sun, Lockyer says that "it is a globe of the fiercest fire, compared to which a mass of white-hot iron is as cold as ice." When we reflect that its magnitude is 1,384,472 times larger than the earth, it seems reasonable to enquire from whence it receives those elements which contribute to maintain its heat and its flame. Silliman, in his Chemistry, says "that the most remarkable property of oxygen is the energy with which it supports combustion."

It may be considered somewhat speculative to ask whether the *light*, which God created on the first day is oxygen, and the *darkness* which was on the face of the deep nitrogen, and that these supply fuel to the sun; and whether fire (that wonderful creation of Almighty power, beyond which matter ceases to exist) became the material executive of His Divine will, dividing the *light* from the *darkness* and performing all these wonderful phenomena we see. However, I have shown by the testimony of astronomers that there is a medium in space. In the next chapter I will endeavour to shew the necessity there exists for the presence in space of such a medium.

CHAPTER V.

THE NECESSITY FOR THE PRESENCE OF A MEDIUM
IN SPACE.

What a powerful agent is the atmosphere we breathe! without it life would become extinct on our globe. Motion on the earth would cease. The fires would be extinguished. In the Manual of Geographical Science I read the following: "If the atmosphere were removed, and our organs of hearing remained, as they now are, a death-like silence would appear to us to pervade Nature, for all sound is connected with vibrations of particles of the air." A cannon might be fired near our ears, and we would not hear the report. Musicians might play upon their instruments, but no sounds would be heard, in fact no sounds could be produced. From this it may be understood that the atmosphere is necessary, not only to convey heat, but sound. If we apply this principle to the consideration of the subject, it may readily appear that a medium in space is necessary for the conveyance of heat to the earth.

Let us reflect for a moment. As I write this I feel that there is some operation going on in my mind, that I have some ideas in reference to the subject upon which I now write. Let us suppose that these ideas are generated in the mind; how do I manage in order to write them on paper? Is there not some channel of

communication between the organ of the mind—my brain—and the paper on which I write? I have just endeavoured to write without ink; I find that the pen would leave no marks. I re-filled my pen, and endeavoured to write without touching the paper; I find that there is nothing on the paper. The communication between the paper and the brain was broken. I do not pretend to understand how the brain communicates certain motions to the pen, and how the pen registers, as it were, the thoughts of the mind; but of this I feel certain, that there is an unbroken communication between the paper and the brain, and that, if this communication were not complete, any efforts of mine to gain results would be futile.

The sun, for instance, has some heat to convey to the earth, probably he desires to revive some drooping flower. How can the sun accomplish his end, unless he have a direct unbroken communication with the flower? Let us see how the sun will do this. The sun will impart his heat to the medium of space, the medium of space will carry it to our atmosphere, and our atmosphere will deliver it to the flower.

If the heat of the sun is communicated to the earth by natural means, then there must be a medium to convey that heat. It is impossible to communicate something to nothing. The sun has heat; the heat of the sun is necessary for the earth. It is necessary, therefore, that the heat of the sun should reach the earth. If we had no atmosphere on our earth, neither heat nor sound could be conveyed from one place to

another. I am, therefore, justified in believing that without a medium in space, the heat of the sun could not be conveyed to the earth, and therefore if the heat of the sun reaches the earth by natural means, the existence of a medium in space is absolutely necessary.

CHAPTER VI.

THAT THE HEAT OF THE SUN CAUSES THE MOTION OF THE MEDIUM.

I have endeavoured to show that there is a medium in space. Let us suppose that this medium of space bears some resemblance to our atmosphere. What effect would the heat of the sun produce upon it? Let us suppose that we enter into a large barn or open shed on a cold winter's day; that there is no wind; and that we build or make a fire in a large stove. What effect would the heat produce on the atmosphere? The heat would first communicate itself to the air surrounding the stove; the hot air would then fly upwards, while the cold air would be continually descending towards the stove. The heat, then, of the stove, would cause a motion of the atmosphere. Let us again suppose that the barn or shed was closed, and that it was surrounded by something to exclude the cold. Let the stove

be made hot. What effect would the heat produce upon the air in the barn? The heat would first communicate itself to the air immediately surrounding the stove, and so soon as the air became more heated than that immediately above it, it would move upwards, while the colder air above would move downwards; and thus a constant communication would be maintained between the stove and the top of the building by means of the air: in other words, there would be currents of cold air rushing down in the direction of the stove, and currents of hot air rushing upwards from it. Let us now suppose that our globe is a ball of fire. What effect would it produce on our atmosphere? We may readily conceive what effect this would produce. The air near the earth would fly in all directions from its centre, while colder air or atmosphere would be continually falling towards it from all directions.

We now see that a continual motion would continue around the earth, and as far upwards as the atmosphere of the earth extended. Then, in answer to the question, what effect does the heat of the sun produce on the medium of space? We may now readily conceive that the heat of the sun would affect the motion of the medium in a manner similar to what the earth, if a globe of fire, would affect its atmosphere, viz., it would cause currents of medium to move with great power to and from the sun.

The idea of currents in space is not a new one. It

was first proposed in France by Mons. LeSage, and excited considerable attention at the time; but he failed to assign any cause for the existence of currents in space.

CHAPTER VII.

A CHAPTER OF EXPLANATIONS.

Were it not for the difficulties which stand in the way, this chapter would have been devoted to explain what causes the sun to revolve on its axis. I must first show what little force is necessary to do so. Let us now suppose that the sun, moon, and all the planets, were removed from space, and that nothing remained but the medium. Let us further suppose that a large, heavy ball were placed at some point in space—would that ball move? The reader will most likely answer the question thus: No, there is nothing to attract it. But this is not my answer to the question. I answer thus: No, the ball is surrounded on all sides by everything that is equal,⁺ consequently it cannot move in one direction more than another.

Let us here reflect for a moment. Would the ball, if once set in motion, ever stop? My reader, who understands the Newtonian Theory, will answer: No, there is nothing to stop it. My answer is similar.

Let us suppose that the ball is again stationary ; would it not be easy to move it. The reader will answer : That it would be an easy matter to move the ball on its axis, no matter what size it might be ; that a child could, under the circumstances, toss the largest balls ever made, as easily as he could marbles. My answer is exactly the same. !!!

Let us now suppose that this large ball was the sun ? Would it not be just as easy to move the sun as the ball ? My reader will answer : " Yes." My answer is exactly the same.

CHAPTER VIII.

THAT THE MOTION OF THE MEDIUM CAUSES THE SUN TO REVOLVE ON ITS AXIS.

When it was proposed in England to construct steamers for the purpose of ocean navigation, scientific men proved, to their own satisfaction, that the idea was absurd. During the days of Sir Isaac Newton, and for centuries previous—yea, up to the time when the Phœnicians navigated the Euxine and Mediterranean seas, and for many years after the death of Sir Isaac Newton—the world knew nothing of the mighty power of fire ; its use, except for domestic purposes, was unknown. Since the days of Sir Isaac Newton, this element has revolutionized

the commercial and manufacturing industries of the world.

In the last chapter I showed how the heat of the sun caused the motion of the medium. When we take into consideration that the diameter of the sun is 886,952 miles, this would give a surface of $3.1416 \times 886,952 \times 886,952$ miles of the "fiercest fire, compared to which a mass of white-hot iron is as cold as ice." What a tremendous force do these figures convey to our mind. Let us suppose that the solar system does not extend beyond the planet Leverrier. The extent of the solar system in that case would be a sphere whose diameter would be 5,700,000,000 miles. If the following operation is performed, viz.: $5,700,000,000 \times 5,700,000,000 \times .5236$, the result will give the number of cubic miles of medium: the sun occupying the centre.

I have already shown how the heat of the sun would cause the motion of the medium; that there would be currents of heated medium moving in all directions from the sun, and from all directions towards it.

"The sun," says Ennis, in his "Origin of the Stars," "is surrounded by a coating of flames from two to four thousand miles high. These flames, like all others, are in a constant state of agitation, and here and there send up flakes much taller than the rest. As a supporter of combustion the sun is surrounded by an atmosphere visible to us nearly half a million of miles high, and therefore its entire probable height, including its invisible portion, must be two

millions of miles. In this atmosphere float immense clouds, some are eighty thousand miles high, and some are eight hundred thousand miles in breadth, which clouds may be regarded as the smoke and vapor of the great conflagration. The body of the sun below the flames is a melted liquid mass, in which mass the chemical action or burning is chiefly taking place, and which like our ocean is disturbed by general and special currents." "In the neighborhood of great spots or extensive groups of them," says Herschel, "large spaces of surface are often observed to be covered with strongly-marked, curved, and branching streaks, more luminous than the rest, called *feculæ*, and among these, if not already existing, spots frequently break out. They may perhaps be regarded, with most probability, as ridges of immense waves in the luminous regions of the sun's atmosphere, indicative of violent agitations in their neighbourhood."

The sun, then, is in the centre of a medium which must be in a state of the most extraordinary commotion. In the last chapter I showed how easy it would be to move the sun. Can we conceive it possible that it could remain unmoved in the centre of such powerful forces?

Let us suppose that the sun was a perfect sphere, and that the temperature at every part of the surface of the sun was exactly the same. The sun could not move for the reason that it would be pressed on all sides by every thing that was equal. But the wisdom of Almighty God has placed spots on the

sun, and this fact tells us, as plainly as language can convey it to the mind, that there are inequalities of heat on the sun's surface—the perfect equilibrium is broken—the sun moves on its axis.

the sun moves on its axis
the sun moves on its axis
the sun

CHAPTER IX.

THAT THE REVOLUTION OF THE SUN ON ITS
 AXIS CAUSES THE MEDIUM TO REVOLVE
 AROUND THE SUN.

Let us now suppose, for the purpose of illustration, that we plunge a spinning top (iron), say two inches long, into a circular vessel containing three inches depth of water. The motion, or spinning of the top, will communicate a motion to the water, causing the water to revolve around the top. A top spinning on the floor also causes a motion of the air in the same direction. Now we may readily conceive that the motion of the sun on its own axis causes the medium of space to revolve around it like an eddy, the sun being in the centre.

CHAPTER X.

THE TWO MOTIONS OF THE MEDIUM EXPLAINED.

In the sixth chapter, I showed that the heat of the sun would cause the motion of the medium, that there would be currents of medium moving to and from the sun. In the ninth chapter, I have shown that the revolution of the sun on its axis would cause the medium to revolve around the sun.

In order to convey an idea of these two motions, it is necessary to premise a somewhat extraordinary supposition? Well, now let us imagine that the air is perfectly calm—that there is not a breath of wind.

Let a balloon be sent upwards, say to a distance of fifty miles. The balloon would revolve with the earth in the same direction. Let us again suppose that a shower of shot had been sent from the balloon to the earth. If the earth did not move, the shot would fall in a straight line towards the centre of the earth. But the revolution of the earth and its atmosphere would cause the shot to be pulled out of a straight line. It will be seen that the shot would have two motions, viz., one in the direction of the centre of the earth, and the other with the earth in its revolution on its axis. Thus one motion of the shot would be due to the revolution of the earth, and the other, according to the Newtonian Theory, to its gravity. In like manner does the heat of the sun cause one motion of the medium, and its revolution the other.

CHAPTER XI.

WHAT CAUSES THE EARTH TO REVOLVE ON ITS AXIS.

I have already shown that the heat of the sun would cause the medium to move in currents to and from the sun.

The earth would intercept these currents, one current would pass over the earth's atmosphere, while the other would pass under it. To illustrate this, take a lead pencil, lay it crosswise on the palm of your left hand, place the palm of your right on the palm of your left hand, pull your left hand towards you, while you push your right hand from you. It will be found that the pencil will revolve between the palms of your hands. In like manner does the earth revolve on its axis—the currents of medium acting as a belt, causing the planets to move on their axis.

CHAPTER XII.

WHAT CAUSES THE MOON TO REVOLVE AROUND THE EARTH.

In the fifth chapter, I attempted to show how the sun, revolving on its axis, causes the medium to revolve around it like an eddy—the sun being the

centre. In like manner the revolution of the earth on its axis causes the medium around the earth to revolve around it like an eddy, the earth being the centre.

The motion of the medium carries the moon in its course around the earth, on the same principle that the planets are carried in their orbits around the sun ; and in the same manner as the balloon would be carried around the earth if there was no wind.

CHAPTER XIII.

THAT THE INEQUALITIES OF HEAT ON THE SUN'S SURFACE ACCOUNTS FOR THE ELLIPTICAL MOTION OF THE PLANETS AROUND THE SUN.

In the fifth chapter, I stated that the presence of dark spots on the sun is evidence that there are inequalities of heat on the sun's surface. I did not in that chapter give any reasons for such a conclusion. The scientific reader will readily understand that there were over four million chances to one, that the sun would revolve on its axis. Even if there were no inequalities of heat on the sun's surface, facts show that it is not a perfect globe. In summer the sun is at a distance from the earth of about ninety-five millions of miles, while in winter the distance is but ninety-one millions of miles. *Quoted from*

To account for a difference of four millions of miles, it should be shewn that the sun varies in temperature about three and one-half per cent. Speaking of the sun's spots, Lockyer says: "Diligent observation of the umbra and penumbra with powerful instruments reveals to us the fact that change is going on incessantly in the region of the spots. Sometimes changes are noticed, after the lapse of an hour even; here a portion of the penumbra is seen setting sail across the umbra; here a portion of the umbra is melting from sight; here, again, there is an evident change of position and direction in masses which retain their form. These enormous changes extending over tens of thousands of square miles of the sun's surface," he adds, "but while our clouds are made up of particles of water, the clouds on the sun must be composed of particles of various metals and other substances." Again, "some spots cover millions of square miles and remain for months." Again, "now as we must get less light from the sun when he is covered with spots than when there are none." Lockyer further tells us that Mr. Balfour Stewart asserts that the dark spots are most probably in some way connected with the action of the planets, and that it is also known that the magnetic needle has its greatest oscillations occurring when there are most sun spots.

The fact of there being present in the clouds particles of various metals and substances melting, is sufficient evidence that there are inequalities of heat on the sun's surface. Dr. Henry, of the Smithsonian Institute, found, by projecting the image of the sun

on a screen, that the spots radiated less heat than the brighter portions of the sun. Let us suppose that the sun was a perfect sphere, and that the heat of the sun was exactly equal at every portion of it, the medium would be affected in every direction in exactly the same way. The temperature at 1,000,000 miles distance from the centre of the sun would, on all sides, be equal; consequently, the propelling power of the sun's heat on the medium would exert an equal force in all directions. We may now readily understand that, inasmuch as the more heated portion of the sun would have the effect of driving the medium to a greater distance from it, so would the less heated portions of the sun have the effect of permitting the medium to approach nearer to the sun.

When the earth is directly opposite a heated portion of the sun, the earth is driven from the sun.

When the earth is directly opposite a less heated portion of the sun, the medium contracts, and therefore draws the earth nearer to the sun.

This causes the elliptical motion of the planets around the sun.

CHAPTER XIV.

ENCKE'S COMET.

When Sir Isaac Newton gave his Law of Attraction to the world, scientific men had no reason to suspect that there was a resisting medium in space.

In 1786, four years after the death of Sir Isaac Newton, a new comet appeared in the heavens. It was again seen in 1795, 1805, 1819, and its return in 1822 was calculated, but it was found to lose two days in each successive period of 1200 days. It was concluded by astronomers that this retardation could not be accounted for upon any other supposition than the existence in space of a medium resisting its motion. Now, according to the Newtonian Theory, the movements of the heavenly bodies were calculated on the supposition that they move in space devoid of any resistance whatever. On applying this supposition to the calculation of Encke's Comet, the supposition was found to be wrong.

"This comet," says Whewell, "was again generally observed in Europe in 1825 and 1828, and the circumstances of the last appearance was particularly favourable for determining the absolute amount of the retardation of the medium."

The presence of this medium in space—if the Newtonian Theory be true—is a source of perplexity. I cannot conceive how the earth and the other planets escape being affected in some way by it. "To us,"

says Prout, in his *Chemistry*, speaking of the molecular hypothesis, "it appears infinitely more probable and more consistent with Almighty power, to suppose that one primary set of laws was originally framed for matter under all circumstances of quantity, than to suppose that two primary and different sets of laws—the one adapted to matter in the mass, the other to matter in the molecule." He then adds: "With a Being infinite in knowledge and power, no such distinction can for a moment be supposed to exist." The fact that it is difficult to conceive why one body is retarded in its course, while others escape retardation, is reason sufficiently manifest to cause us to enquire, whether the law of attraction is true; and whether there is any reasonable hypothesis which, while explaining the cause of motion itself, will also account for the presence in space of a medium not resisting the motion of the heavenly bodies, besides accounting for the apparent retardation of Encke's comet.

CHAPTER XV.

SUPPOSITIONS NECESSARY TO EXPLAIN THE PECULIAR MOTIONS OF THE COMETS.

FIRST SUPPOSITION.

Let us again suppose that all the heavenly bodies were removed from space, and that nothing remained but the medium.

Let us also suppose that a large, heavy ball were placed in space, would that ball move?

Newton's first Law of Motion asserts that a body at rest continues at rest, and that a body in motion goes on moving with its velocity and direction unchanged, except so far as it is acted on by extraneous forces.

"In Mathematics," says Dugald Stewart, "the first principles from which we reason are a set of axioms which are not intuitively certain, but of which we find it impossible to conceive the contraries to be true."

This remark appears as equally applicable to the Science of Astronomy as it does to that of Mathematics. Now, inasmuch as it appears contrary to reason to suppose that the ball could move in one direction more than another, it is, therefore, agreeable to reason to conclude that the ball would remain where placed, and consequently would not move.

SECOND SUPPOSITION.

Let us again suppose that the whole of space does not contain any of the heavenly bodies—that there is nothing in space but the large, heavy ball, and the ether or medium of space. Let us further suppose that a great heat were generated at a distance from the ball, would that ball move, and if so, in what direction?

It will be noticed that the ball is not now sur-

rounded by the same conditions in which we first supposed it to be.

In the following

A B C

Let A represent a point in space as far distant from B as C is from B. Let B represent the large heavy ball, and C the point where there is a great heat generated. Heat we are told decreases in proportion to the square of its distance, consequently it will be colder at A than at B, and colder at B than at C. In other words, the medium of space will be denser at A than at B, and denser at B than at C. It is evident that the ball is not now surrounded by the same conditions in which we first supposed it to be. It seems contrary to reason that the ball could move in the direction of A, because it would encounter greater resistance than if it moved in the direction of C. In the first supposition, the ball was surrounded on all sides by every thing that was equal. We could not conceive it to move in one direction more than in that of another; but in this case the circumstances are materially changed, and we are justified in concluding that the ball would move in a direction in which it would meet with the least resistance; it would therefore move in the direction of C, or in other words it would move from the denser part of the medium to the rarer.

There is a remarkable passage in Whewell's *Astronomy*, viz. :

“To show (says Sir Isaac Newton) that I do not take gravity for an essential property of bodies,

have added one question concerning its cause, choosing to propose it by way of question, because I am not satisfied about it for want of experiments." Whewell adds: "The hypothesis which he suggests is, that there is an elastic medium pervading all space, and increasing in elasticity, as we proceed, from dense bodies outwards, and that this (says Sir Isaac Newton) causes the gravity of such dense bodies to each other, every body endeavouring to go from the denser part of the medium to the rarer." It seems that no attention whatever was given to this hypothesis by the followers of Sir Isaac Newton. Whewell calls it "gratuitous," and further adds:—"Can we, on Newton's principles, conceive an elastic medium otherwise than as a collection of particles repelling each other?" Sir Isaac Newton had already given to the world his Law of Attraction. The hypothesis mentioned seems to have been an after-thought. I infer this from the fact that it appeared for the first time in the second edition of his Optics. However, his followers should have considered it upon its own merits, irrespective of any other theory which Sir Isaac Newton may have advanced. The theory which I now give to the world is opposed to Newton's law of attraction, but in perfect harmony with the hypothesis which he suggested. I have simply added heat, in order to show how the medium of space would be denser at one point than at another.

CHAPTER XVI.

THE CAUSE OF THE PECULIAR MOTION OF THE
COMETS EXPLAINED.

I have already explained how the sun, revolving on its axis, causes the medium of space to revolve like an eddy, the sun being the centre.

I endeavoured to show in the second supposition, how a body would move from the denser part of the medium to the rarer.

Now let us suppose that the comet is moving in the direction of the sun. If the medium was not in motion, the comet would move in the direction of the sun, in a straight line. But in consequence of the medium having a circular motion, this motion of the medium would pull the comet out of a straight line in its journey towards the sun, on the same principle that balls descending from the summit of a high tower fall east of the point whence they started. In 1804, thirty balls were dropped from Michael's Tower, in Hamburgh, from the height of 235 feet, when the deviation from a perpendicular was found to be one-third of an inch. The reason given for this variation is simply ridiculous, and I venture to say that if the same experiment be made with balls of different densities, and of the same size, the deviation will vary.

Let us now suppose that the comet has reached the sun. The close proximity of the comet to the

intense heat of the sun will again re-animate the dying comet, which will start afresh on its journey through space, becoming colder in proportion to its distance from the sun. When the comet arrives at some point in which the density and temperature of the medium are equal to the density and temperature of the comet, the comet returns again to the sun, and is driven again as a courier carrying despatches of moment to the remotest parts of the solar system.

There is another fact in reference to comets which requires explanation. Mr. Lockyer, in his admirable little work on astronomy, published by Macmillan & Co., London, England, says, "While some revolve round the sun in the same direction as the planets, others revolve from east to west."

The reader has a right to expect an explanation, why the comets, according to my theory do not all move in the same direction.

It will be remembered that the circular motion of the medium is derived from the motion of the sun, while the moving power of the comets travelling from the sun is derived from its heat, and as there are inequalities of heat on the sun's surface, some accidental circumstance may cause the superior force of the sun's heat to drive the comet in an opposite direction to the medium.

CHAPTER XVII.

WHY THE EARTH AND THE PLANETS DO NOT FALL
TOWARDS THE SUN LIKE THE COMETS.

The theory of attraction offers no solution to this question.

I have already shown how the heat of the sun causes currents of medium to flow to and from the sun. The earth, unlike the comets, has heat independently of that which it derives from the sun. Now, as the heat of the sun throws out currents of medium in all directions, so does the heat of the earth send out currents of its atmosphere in all directions. These currents encounter each other at some point in which their temperatures and density are equal, and the mutual pressure of one on the other prevents the earth from falling towards the sun.

It may be well here to observe that in the atmosphere of the sun we are told that there is metallic matter or vapor. In our atmosphere we have aqueous vapors, &c., which commingle with what I suppose the medium of space to be, viz., oxygen, nitrogen, or hydrogen, or all. The aqueous vapor, having ascended, condenses, and falls to the earth in the form of rain, snow and hail. In like manner the metallic vapors of the sun condense or cool, and fall towards the sun in the form of metallic showers—like rain, snow or hail.

CHAPTER XVIII.

WHY THE PLANETS MOVE QUICKLY NEAR THE SUN,
AND SLOWLY AT A DISTANCE FROM IT.

I have already explained that the heat of the sun causes the circular motion of the medium. Now, inasmuch as the light and heat of the planets increase or decrease in proportion to the square of their distances from the sun, so does the density of the medium increase or decrease in proportion to the square of its distance from the sun.

Let us suppose that you spin an iron top in the centre of a circular vessel, say one hundred feet in diameter, containing water to the depth of two inches. The water near the spinning top will move rapidly around, while at a distance from the top the motion will be slower.

The illustration will be much better if the reader suppose the water gradually to increase in density from the top. In proportion as the water increases in density, so would the velocity of its motion decrease. In like manner the velocity of the planets decrease in proportion to their distances from the sun.

The planet Mercury, which is about 35,393,000 miles from the sun, travels in its orbit around the sun at a velocity of about 1700 miles per minute. Venus, which is 60,130,000, goes at the rate of 1220 miles. The earth, at a distance of 91,430,000 miles, moves at

the rate of 1099 miles per minute. While Neptune, at the enormous distance of 2,746,271,000 miles from the sun, performs its journey at the rate of only 199 miles per minute.

CHAPTER XIX.

GENERAL REFLECTIONS ON THE SUBJECT.

If we had no idea of the existence of our atmosphere, to what ridiculous expedients we would be driven to account for rain and snow, and how heat and sound are transmitted from place to place. In the theory of attraction, the medium of space is entirely ignored. Nay, more, it is regarded as a "resisting" medium. Is our atmosphere a "resisting" medium? In some cases it may appear as such; but the knowledge which we possess of our atmosphere enables us to say, that it is more of an assisting than that of a resisting medium. Our atmosphere is present, and takes part in all the operations of nature. Can it be supposed for one moment that Almighty God created the medium of space for the sole purpose of resisting Encke's Comet in its progress.

Astronomers assure us that the medium of space retards Encke's Comet in its course. In the face of the world, I deny this.

Man may be retarded or may retard some operations of Nature, but matter obeys the will of God, and Encke's Comet obeys a law as sure and as certain in its operations as any other law.

The moment we recognise or admit the existence of a medium in space, it is not difficult to account for the motion of the planets and comets. If it be admitted that I have satisfactorily accounted for the motion of these bodies, what necessity does there exist for the law of attraction?

To my mind it seems somewhat extraordinary, how any person could propose any theory to account for the forces which are necessary to keep the planets in their positions, before he knew the agency, and the amount of force which not only caused the planets to move, but also kept them moving.

According to the theory which I have proposed for the consideration of the world, the sun is the capital of the solar system, and each planet is but a province of that system, and these provinces, as well as the sun are separated from each other by an unfathomable sea of medium. The heat of the sun causes the motion of the medium. The motion of the medium causes the sun to revolve on its axis as well as the planets. The revolution of the sun on its axis communicates a second motion to the medium causing it to revolve. The medium revolving, carries the planets in their orbits around the sun. By one grand law, the sun, in consequence of its magnitude and the intensity of its heat, maintains itself in a

STATE OF EQUILIBRIUM

central position, and exercises an influence nearly equal in every direction.

The sun is not only the capital of the solar system, but it is likewise the throne on which is seated in royal magnificence that great Fire King who rules the motion of the planets by his heat—calls into existence all those inherent properties of matter, including that of gravity itself, and performs all the wonderful phenomena we see in the world.

